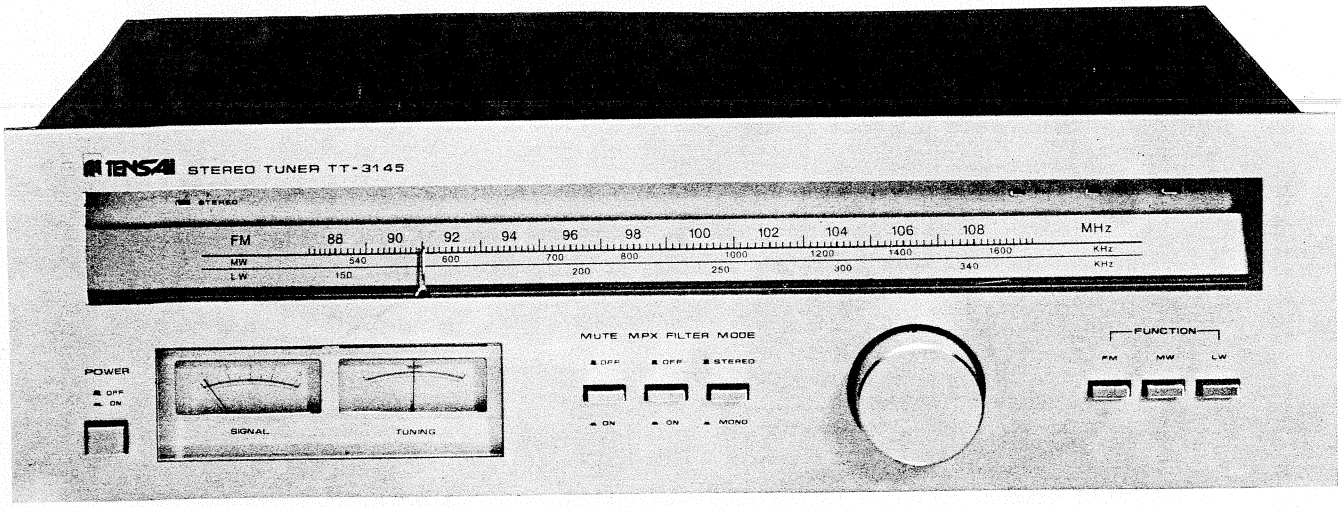
TT-3145

3-BAND FM/MW/LW TUNER

TENSAI

INTERNATIONAL



Service Manual

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SPECIFICATIONS

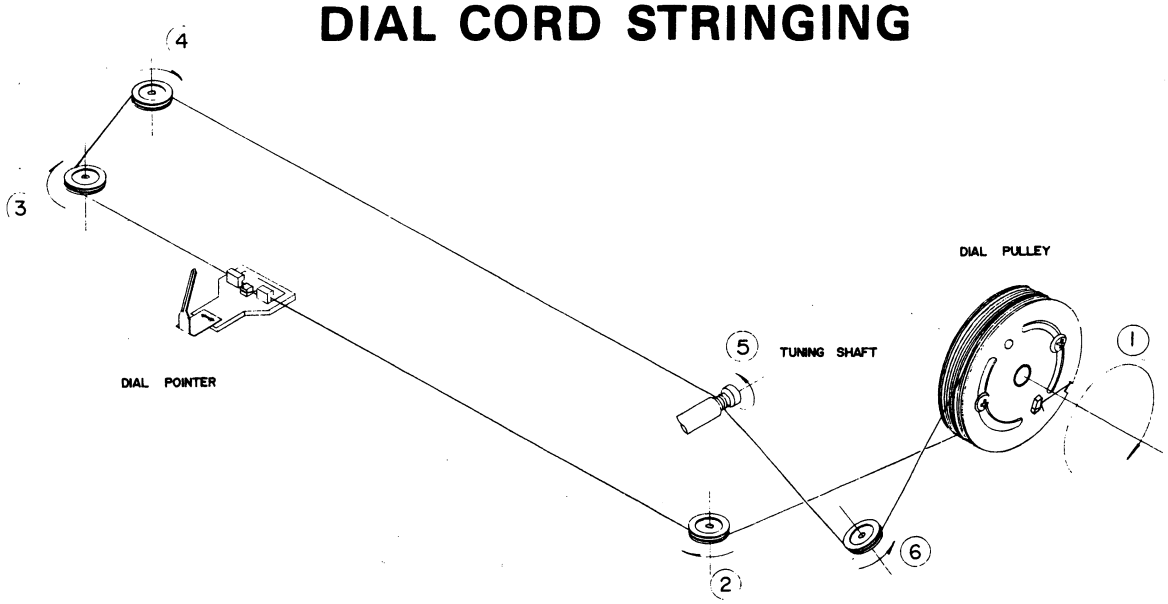
FM SECTION

TUNING RANGE		87.5-108.5MHZ
SENSITIVITY, 26 dB S/N	Mono	1μV
	Stereo	5μV
46 dB S/N	Mono	10μV
	Stereo	50μV
ALTERNATE CHANNEL SELECTIVITY		50dB
SPURIOUS RESPONSE REJECTION		70dB
AM SUPPRESSION		50dB
CAPTURE RATIO		1.5dB
SUBCARRIER REJECTION		40dB
THD at 1KHz, 100% modulation,	Mono	0.2%
	Stereo	0.4%
S/N RATIO, ref. 100% modulation,	Mono	70dB
	Stereo	65dB
STEREO SEPARATION at 1KHz		40dB
FREQUENCY RESPONSE, –3dB		10Hz-15KHz
OUTPUT LEVEL at 30% modulation		200mV/4.7Kohm

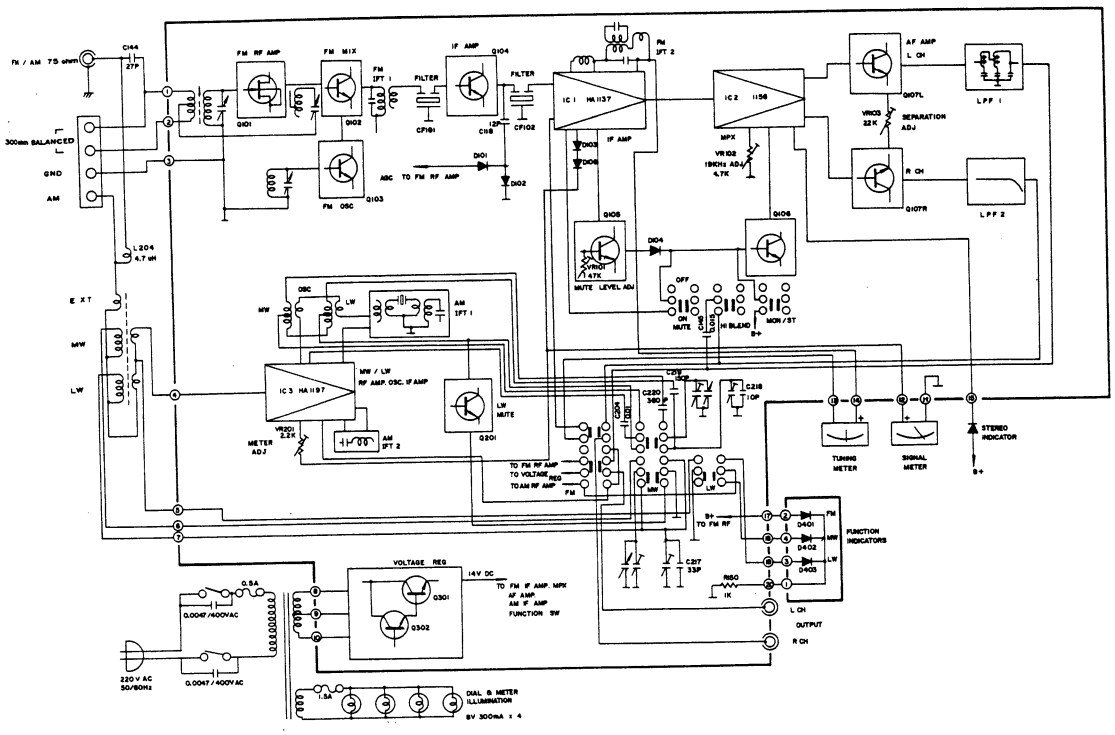
MW/LW SECTION

TUNING RANGE	MW	520-1, 605KHz
	LW	150-350KHz
SENSITIVITY, 20dB S/N, Bar antenna	MW	300μV/m
	LW	500μV/m
SELECTIVITY		30dB
IF REJECTION		35dB
IMAGE REJECTION		40dB
SIGNAL TO NOISE RATIO 30% mod.		40dB
FREQUENCY RESPONSE, –3dB		20Hz-2KHz
OUTPUT LEVEL at 30% modulation		200mV/4.7Kohm
POWER CONSUMPTION		16W
UNIT DIMENSION (W x H x D)		430 x 136 x 370mm
UNIT WEIGHT		6.2kg

DIAL CORD STRINGING



BLOCK DIAGRAM



ELECTRICAL ADJUSTMENT PROCEDURE

I. MW TUNER ALIGNMENT

1. SET THE FUNCTION PUSH SWITCH TO MW
2. SET THE AM SIGNAL GENERATOR AS SHOWN FIG 1

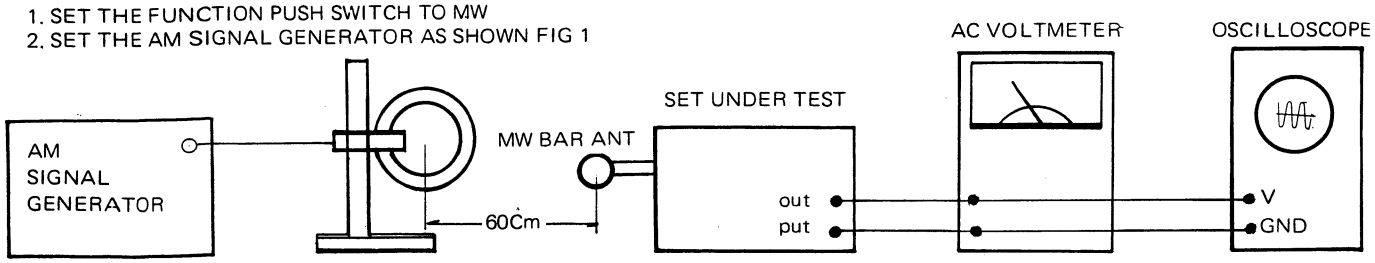


Fig 1. AM ALIGNMENT TEST SET UP
*SG OUT PUT LEVEL–1KHz. 30% MOD. AS LOW AS POSSIBLE

STEP	SG FREQUENCY	DIAL INDICATION OF SET UNDER TEST	ADJUST	INDICATION
1	455 KHz	LOWEST POSITION	IFT 201	MAXIMUM AC VOLT METER READING
2	600 KHz	600 KHz	MW OSC COIL L201	MAXIMUM AC VOLT METER READING
3	1400 KHz	1400 KHz	TRIMMER TC204	
4	REPEAT STEP 2 AND 3 UNTIL NO FURTHER IMPROVEMENT IS NOTICED			
5	600 KHz	600 KHz	MW ANT COIL	MAXIMUM AC VOLT METER READING
6	1400 KHz	1400 KHz	TRIMMER TC203	
7	REPEAT STEP 5 AND 6 UNTIL NO FURTHER IMPROVEMENT IS NOTICED			

II. LW TUNER ALIGNMENT

1. SET THE FUNCTION PUSH SWITCH TO LW
2. SET THE AM SIGNAL GENERATOR AS SHOWN FIG 2

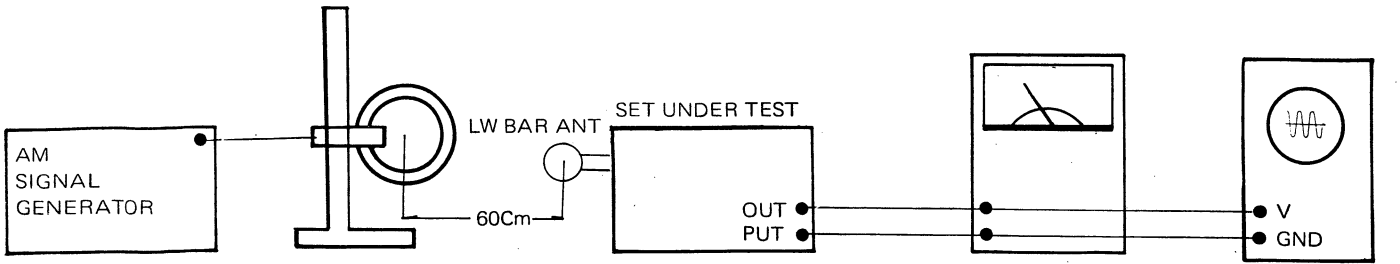


FIG 2. LW ALIGNMENT TEST SET UP
*SG OUTPUT LEVEL–1 KHz 30% MOD AS LOW AS POSSIBLE

STEP	SG FREQUENCY	DIAL INDICATION OF SET UNDER TEST	ADJUST	INDICATION
1	160 KHz	160 KHz	LW OSC COIL L202	MAXIMUM AC VOLT METER READING
2	340 KHz	340 KHz	TRIMMER TC 202	
3	REPEAT STEP 1 AND 2 UNTIL NO FURTHER IMPROVEMENT IS NOTICED			
4	160 KHz	160 KHz	LW ANT COIL	MAXIMUM AC VOLT METER READING
5	340 KHz	340 KHz	TRIMMER TC201	
6	REPEAT STEP 5 AND 6 UNTIL NO FURTHER IMPROVEMENT IS NOTICED			

III. FM TUNER ALIGNMENT

A. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

1. SET THE FUNCTION PUSH SWITCH TO FM
2. SET THE FM SIGNAL GENERATOR AS SHOWN FIG 3 WITH 400Hz. 100% (75KHz DEV) MODULATION
3. SET THE MUTE SWITCH TO OFF

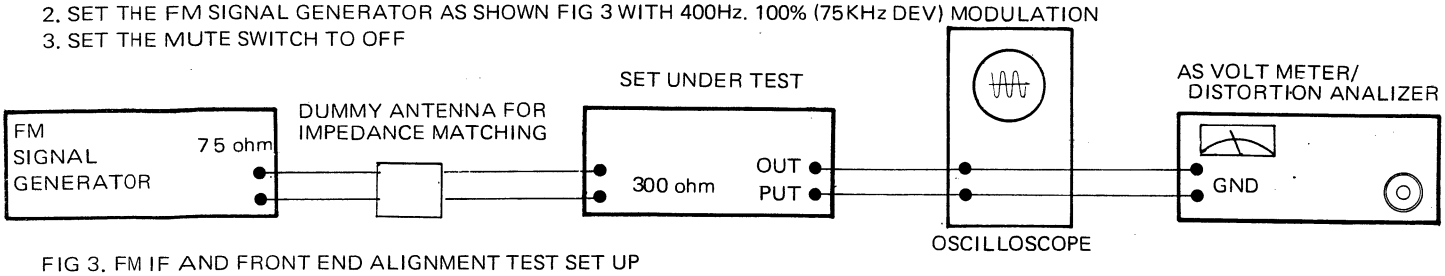


FIG 3. FM IF AND FRONT END ALIGNMENT TEST SET UP

STEP	SG FREQUENCY	SG OUTPUT LEVEL	DIAL INDICATION OF SET UNDER TEST	ADJUST	INDICATION
1	98 MHz	NO INPUT SIGNAL	98 MHz	T102	TUNING METER POINTS TO THE CENTER
2		1000μV (60dB)		T103	TO MINIMIZE DISTORTION
3	REPEAT STEP 1 AND 2 UNTIL NO FURTHER IMPROVEMENT IS NOTICED				
4	90 MHz	AS LOW AS POSSIBLE	90 MHz	OSC COIL 103	MAXIMUM OUTPUT READING
5	106 MHz		106 MHz	TRIMMER TC103	
6	REPEAT STEP 4 AND 5 UNTIL NO FURTHER IMPROVEMENT IS NOTICED.				
7	90 MHz	AS LOW AS POSSIBLE	90 MHz	L102	MAXIMUM OUTPUT READING
8	106 MHz		106 MHz	TRIMMER TC101, 102	
9	REPEAT STEP 7 AND 8 UNTIL NO FURTHER IMPROVEMENT IS NOTICED				

B. FM MPX AND MUTING ADJUSTMENT

1. SET THE FUNCTION PUSH SWITCH TO FM
2. SET THE MODE SWITCH TO STEREO
3. SET THE FM SIGNAL GENERATOR AS SHOWN FIG 4
4. SET THE STEREO SG TO 400 Hz 90% (67.5 KHz) PILOT 10% (7.5 KHz) MODULATION

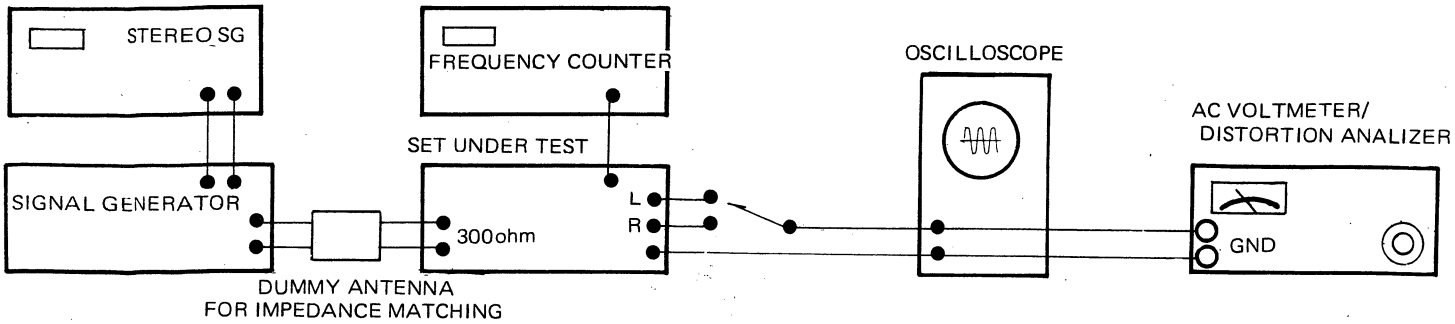
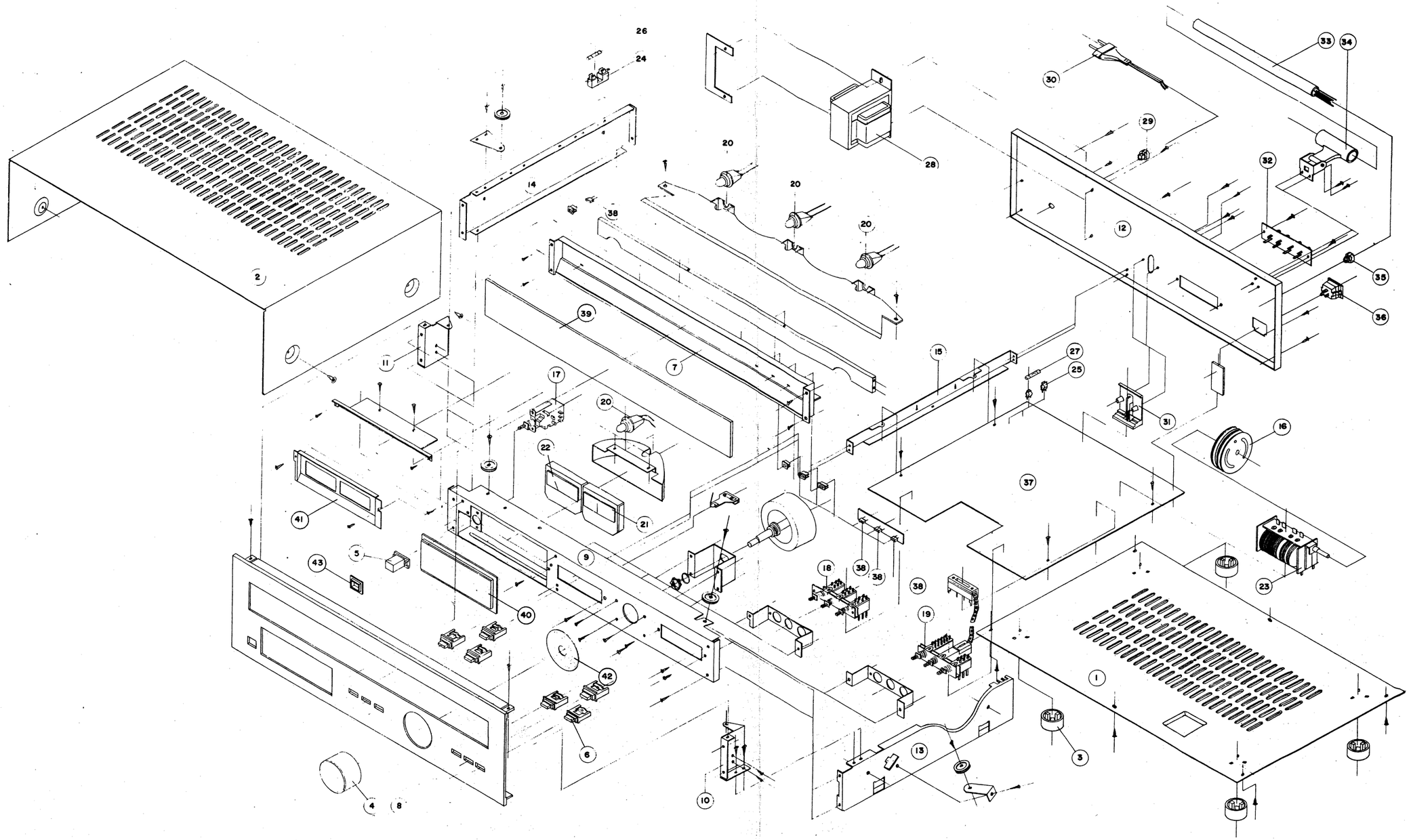


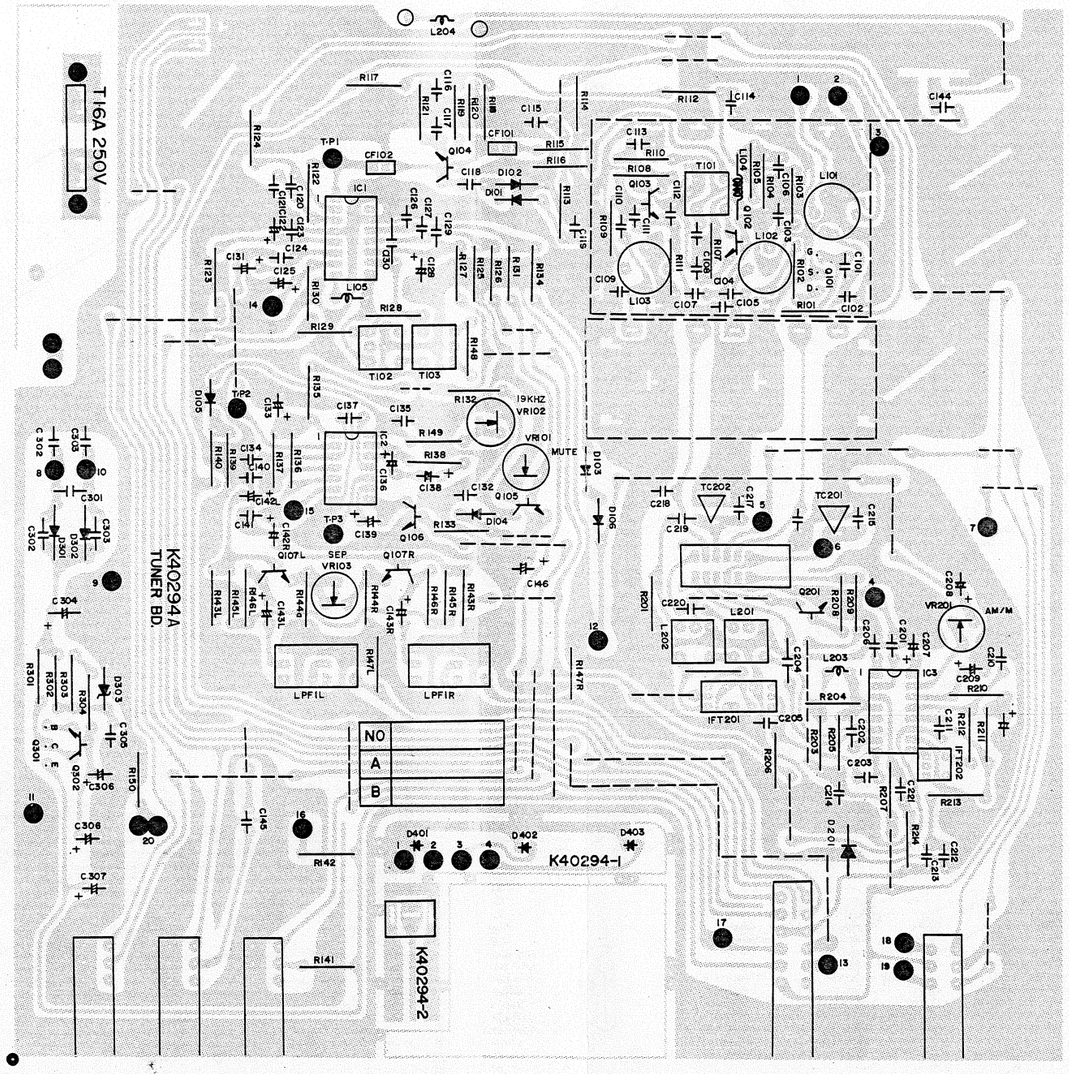
FIG4. FM MPX AND MUTING ADJUSTMENT TEST SET UP

STEP	SG FREQUENCY	SG OUTPUT	LEVEL SG MODE	DIAL INDICATION OF SET UNDER TEST	ADJUST	INDICATION
1	98 MHz	1000μV (60dB)	CW	98 MHz	VR102	19 KHz +50 Hz AT TP–3
2	98 MHz	1000μV (60dB)	L (or R)	98 MHz	T101	TO MINIMIZE STEREO THD
3					VR103	TO MINIMIZE OUTPUT READING AT R.CH (or L) OUTPUT
4	98 MHz	7μV	L+R	98 MHz	VR101	-3dB OUTPUT LEVEL

EXPLODED VIEW OF CABINET AND CHASSIS



TOP VIEW OF P.C. BOARDS



PARTS LIST

. No.	Parts No.	Description	Q'ty
		PACKING PARTS LIST	
	PE-74172-01	Inner Box	1
	PE-74066	Poly Bag	1
	PC-74171	Cushion (Right & Left)	2
		ACCESSORY PARTS LIST	
	PE-67020	Double Phone Plug	1
	96032-1	Operation Manual	1
	96000-10	Product-Certificate Card	1
	PE-67029	FM Dipole Ant	1
		CABINET PARTS LIST	
1	PC-62242	Bottom Cover	1
2	PC-62243	Cabinet	1
3	AD-71045	Foot Ass'y	4
		APPEARANCE PARTS LIST	
4	PE-72177	Tuning Knob	1
5	AE-72171	Push Knob (Power)	1
6	AE-72170	Push Knob Ass'y (Function)	6
7	PC-63076	Dial Scale	1
8	AC-61077	Front Panel Ass'y	1
		CHASSIS PARTS LIST	
9	PC-62249	Front Chassis	1
10	PE-68413	Dial Scale BKT(R)	1
11	PE-68414	Dial Scale BKT(L)	1
12	PC-62246	Back Chassis	1
13	PC-62248	Main Frame(R)	1
14	PC-62247	Main Frame(L)	1
15	PD-62245	Support Frame	1
16	PE-66047	Dial Pulley	1
		ELECTRICAL PARTS LIST	
17	PD-95055	Power SW(SDG5P-E)	1
18	PD-90191	Push SW(3 gang)	1
19	PD-95056	Remote SW Ass'y	1
20	PE-64058	Lamp	4
21	PD-75027-02	Meter (Tuning)	1
22	PD-75027-01	Meter (Signal)	1
23	PD-66029	Front End	1
24	PE-69096	Fuse Holder (20m/m)	1
25	PE-69094	Fuse Clip (20m/m)	2
26		Fuse (T160mA/250V)	1
27		Fuse (Lamp T1.6A/250V)	1
28	PD-35073	Transformer	1
29	PE-71008A	AC Cord Stopper	1
30	PE-67051	AC Cord	1
31	PE-95054	RCA Jack (2P)	1
32	PE-76018-02	Ant Terminal	1
33	PE-67055	LW/MW Ant Bar	1
34	AE-10059	Ant Holder Ass'y	1
35	PD-71008	Ant Cord Stopper	1
36	PE-95053	Ant Connector	1
37	AK40294	Tuner PCB Ass'y	1
38		LED SLP-141B	4
		FRONT PANEL ASS'Y PARTS LIST	
8	PC-61077	Front Panel	1
39	PE-63077	Glass Lens	1
40	PE-63074	Meter Window	1
41	PE-63075	Meter Plate	1
42	PE-72178	Tuning Strip Felt	1
43	PE-72172	Push SW Power Bezel	1
		TUNER P.C.B ASS'Y	

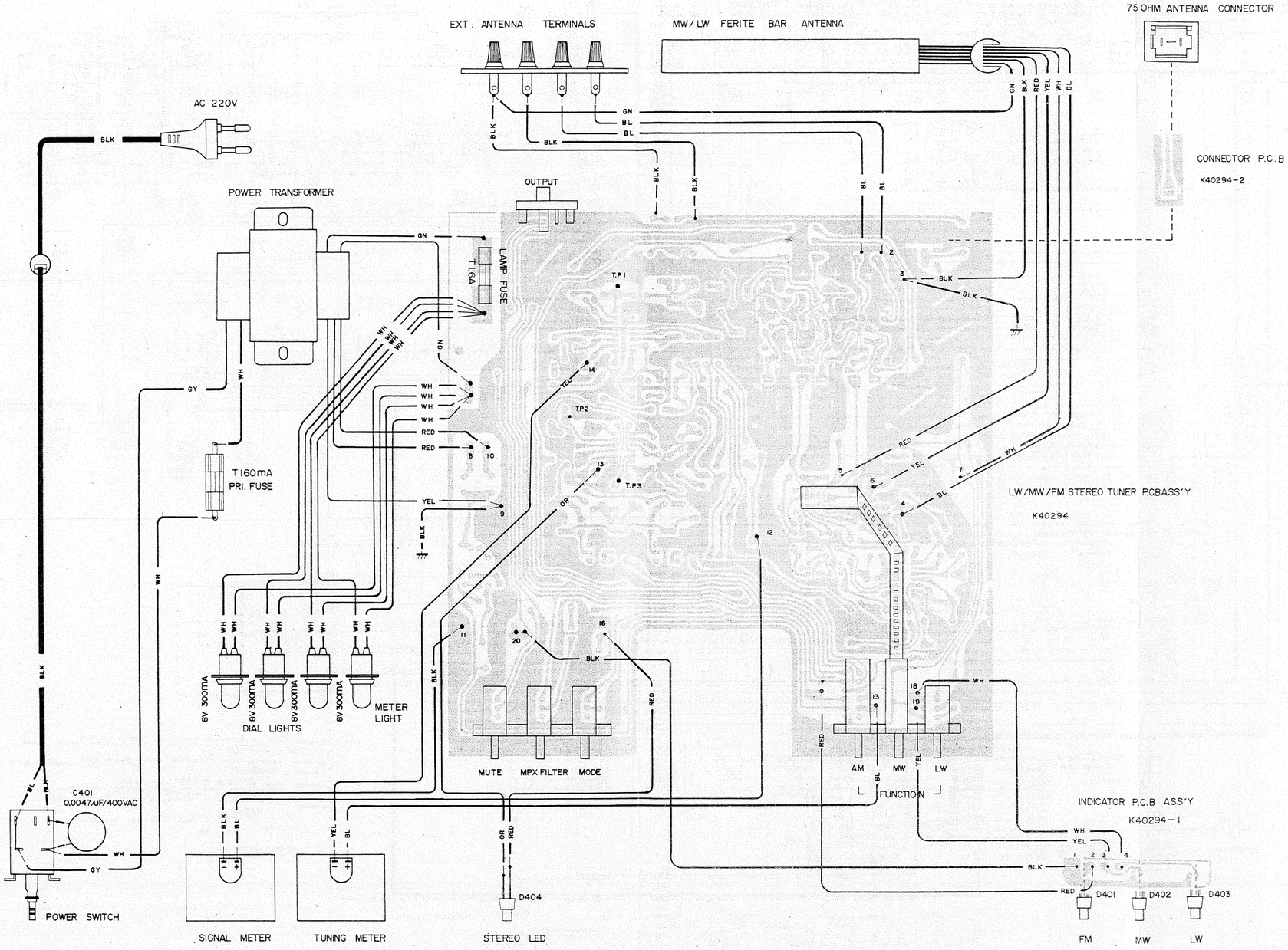
Ref. No.	Parts No.	Description	Q'ty
		FM SECTION	
		SEMICONDUCTORS	
IC1		HA1137W or AN377	1
IC2		HA1156W or AN115	1
Q101		2SK 19GR	1
Q102, 103		CS9016G	2
Q104		CS9018F	1
Q105, 106		2SC1815 or 2SC374BL	2
Q107, R/L		2SC1000BL	2
D101, 102		1N60 PAIR	2
D103, 104, 105, 106		CDG24	4
		CAPACITORS	
C101, 106	50CE101-50K	Ceramic 100PF 50WV	2
C102, 105	50CE150R-50J	Ceramic 15PF 50WV (RH)	2
C103, 108, 113, 114, 115, 117, 120, 121, 123, 126, 127	50CE203-50K	Ceramic 0.02μF 50WV	11
C104	50CE509-50J	Ceramic 5PF 50WV	1
C107	50CE309C-50J	Ceramic 3PF 50WV (CH)	1
C109	50CE220R-50J	Ceramic 22PF 50WV (RH)	1
C110, 112	50CE100R-50J	Ceramic 10PF 50WV (RH)	2
C111	50CE330C-50J	Ceramic 33PF 50WV (CH)	1
C116, 119, 129, 130, 132	50CE473-50K	Ceramic 0.047μF 50WV	5
C118	50CE120-50J	Ceramic 12PF 50WV	1
C122, 142 R/L, 146	50AL109-16E	Elect 1μF 16WV	1
C124	50CE331-50K	Ceramic 330PF 50WV	1
C125, 128, 131, 143 R/L	50AL479-16E	Elect 4.7μF 16WV	5
C133	50AL221-16E	Elect 220μF 16WV	1
C134	50PS681-50J	Poly 680PF 50WV	1
C135	50PS471-50J	Poly 470PF 50WV	1
C136	50AS228-16E	Al Solid 0.22μF 16WV	1
C137	50MY473-50J	Mylar 0.047μF 50WV	1
C138, 139	50AS478-16E	Al Solid 0.47μF 16WV	2
C140, 141	50MY103-50J	Mylar 0.01μF 50WV	2
C144	50CE270-50J	Ceramic 27PF 50WV	1
C145	50MY153-50J	Mylar 0.015μF 50WV	1
		RESISTORS	
R101, 113	60F104-¼J	Carbon 100K ohm ¼W J	2
R102, 110, 117, 127, 135	60F101-¼J	Carbon 100 ohm ¼W J	5
R103, 130	60F221-¼J	Carbon 220 ohm ¼W J	2
R104, 111, 118, 147 R/L	60F332-¼J	Carbon 3.3K ohm ¼W J	5
R105	60F223-¼J	Carbon 22K ohm ¼W J	1
R107, 121, 138, 142, 150	60F102-¼J	Carbon 1K ohm ¼W J	5
R108, 109, 123, 129	60F103-¼J	Carbon 10K ohm ¼W J	4
R112	60F560-¼J	Carbon 56 ohm ¼W J	1
R114	60F105-¼J	Carbon 1M ohm ¼W J	1
R115	60F181-¼J	Carbon 180 ohm ¼W J	1
R116, 120	60F561-¼J	Carbon 560 ohm ¼W J	2
R119, 122	60F331-¼J	Carbon 330 ohm ¼W J	2
R124	60F564-¼J	Carbon 560K ohm ¼W J	1
R125, 133	60F473-¼J	Carbon 47K ohm ¼W J	2

PARTS LIST

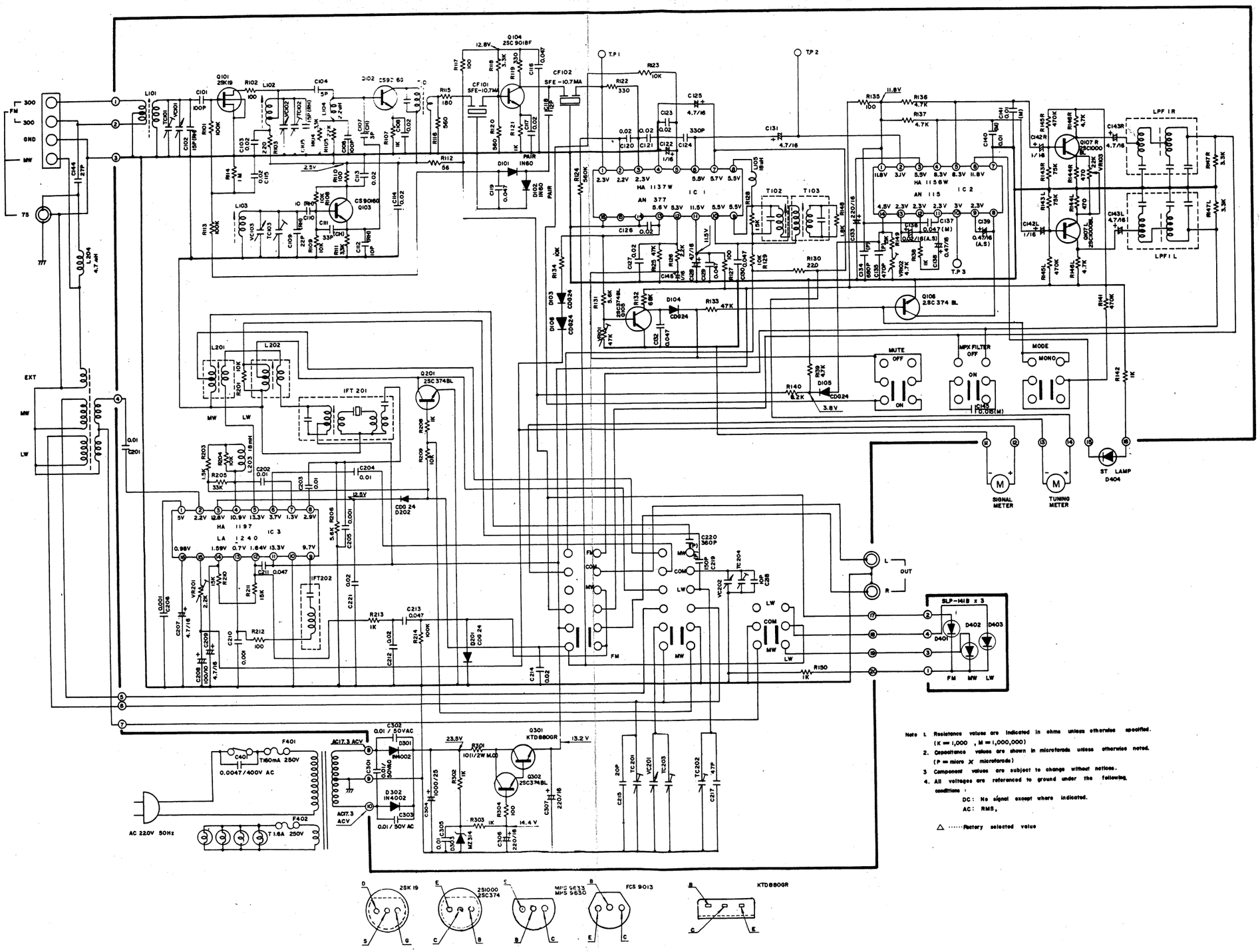
Ref. No.	Parts No.	Description	Q'ty
R126	60F222-¼J	Carbon 2.2K ohm ¼W J	1
R128, 149	60F153-¼J	Carbon 15K ohm ¼W J	2
R131	60F562-¼J	Carbon 5.6K ohm ¼W J	1
R132	60F683-¼J	Carbon 68K ohm ¼W J	1
R134	60F123-¼J	Carbon 12K ohm ¼W J	1
R136, 137, 139, 146 R/L	60F472-¼J	Carbon 4.7K ohm ¼W J	5
R140	60F822-¼J	Carbon 8.2K ohm ¼W J	1
R141, 145 R/L	60F474-¼J	Carbon 470K ohm ¼W J	3
R143R/L	60F753-¼J	Carbon 75K ohm ¼W J	2
R144R/L	60F471-¼J	Carbon 470 ohm ¼W J	2
R148	60F182-¼J	Carbon 1.8K ohm ¼W J	1
SEMIFIXED RESISTORS			
VR101	#16002(SR19R-B)	Carbon 47K ohm ¼W J	1
VR102	#16000(SR19R-B)	Carbon 47K ohm ¼W J	1
VR103	#16003(SR19R-B)	Carbon 22K ohm ¼W J	1
COIL & INDUCTORS			
L101	PE-30096	FM Ant Coil	1
L102	PE-30097	FM RF Coil	1
L103	PE-30052 A	FM OSC Coil	1
L104	PE-30057	Inductor 2.2μH	1
L105	PE-30112	Inductor 1 8μH	1
T101	PE-30053	FM IFT	1
T102	PE-30122	FM Quad Det-A	1
T103	PE-30123	FM Quad Det-B	1
FILTERS			
CF101, 102	#31008	Ceramic SFE 10.7MA8	2
LFP1 R/L	PE-31009	FM MPX Filter Block	2
MW/LW SECTION			
SEMICONDUCTORS			
IC3		HA1197 or LA1240	1
Q201		2SC 1815 or 2SC 374BL	1
D201, 202		CDG24	2
CAPACITORS			
C201, 202, 203, 204, C205, 210	50CE103-50K	Ceramic 0.01μF 50WV	4
206	50CE102-50K	Ceramic 0.001μF 50WV	3
C207, 209	50AL479-16E	Elect 4.7μF 16WV	2
C208	50AL101-16E	Elect 100μF 16WV	1
C211 213,	50CE473-50K	Ceramic 0.047μF 50WV	2
C212, 214, 221	50CE203-50K	Ceramic 0.02μF 50WV	3
C215	50CE200-50J	Ceramic 20PF 50WV	1
C217	50CE470-50J	Ceramic 47PF 50WV	1
C218	50CE100-50J	Ceramic 10PF 50WV	1
C219	50PS151-50J	Poly 150PF 50WV	1
C220	50PS361-50J	Poly 360PF 50WV	1
TRIMMERS			
TC201, 202		Trimmer CAP ECV-12W 20x31	2
RESISTORS			
R201, 204, 209,	60F103-¼J	Carbon 10K ohm ¼W J	3
R210, 211		Carbon 15K ohm ¼W J	2
R203	60F152-¼J	Carbon 1.5K ohm ¼W J	1
R205	60F333-¼J	Carbon 33K ohm ¼W J	1

Ref. No.	Parts No.	Description	Q'ty
R206	60F562-¼J	Carbon 5.6K ohm ¼W J	1
R208, 213	60F102-¼J	Carbon 1K ohm ¼W J	2
R212	60F101-¼J	Carbon 100 ohm ¼W J	1
R214	60F104-¼J	Carbon 100K ohm ¼W J	1
SEMIFIXED RESISTORS			
VR201	#16004(SR19R-B)	Carbon 2.2K ohm ¼W J	1
COIL & INDUCTORS			
L201	PE-30101A	MW OSC COIL	1
L202	PE-30120	LW OSC COIL	1
L203	PE-30124	Inductor 18mH	1
L204	PE-31012	Inductor 4.7μH	1
IFT201	PE-30121	AM IFT W/Ceramic	1
IFT202	PE-30103	AM IFT	1
REGULATER SECTION			
SEMICONDUCTORS			
Q301		KTD880GR	1
Q302		2SC1815 or 2SC 374BL	1
D301, 302		1N4002	2
D303		MZ314	1
CAPACITORS			
C301, 302,	50CE103-500J	Ceramic 0.01μF 500WV	3
C304	50AL102-25E	Elect 1000μF 25WV	1
C305	50CE103-50K	Ceramic 0.01μF 50WV	1
C306, 307	50AL221-16E	Elect 220μF 16WV	2
RESISTORS			
R301	60M100-½K	Metal 10 ohm ½W K	1
R302, 303	60F102-¼J	Carbon 1K ohm ¼W J	2
R304	60F101-¼J	Carbon 100 ohm ¼W J	1
CHASSIS SECTION			
CAPACITORS			
C401	ECK-DHS472MD4	Ceramic 0.0047μF 400V AC	1
P. C. Bs			
	K40294	LW/MW/FM Stereo PCB	1
	K40294-1	Indicator PCB	1
	K40294-2	Connector PCB	1

POINT TO POINT WIRING DIAGRAM



SCHEMATIC DIAGRAM



Note 1. Resistance values are indicated in ohms unless otherwise specified.
(K = 1,000 , M = 1,000,000)

2. Capacitance values are shown in microfarads unless otherwise noted.
(P = micro X microfarads)

3. Component values are subject to change without notice.

4. All voltages are referenced to ground under the following conditions :

DC : No signal except where indicated.

AC : RMS,

△ ·····Factory selected value